



# **DOD STANDARDIZATION CONFERENCE**

## ***Exploring System Commonality, Obsolescence Management, and Acquisition Improvement***

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# ***Agenda***

- ***Mandate for Commonality***
- ***Basic Approach***
- ***NAVSEA Commonality Initiative***
- ***Moving Forward***

# Mandate for Commonality

## Example: Machinery Control Systems

Ship Class	CG 53,54,61,67,1	CG 1 SC re-architecture (all future ISC installs)	DDG FLT 1/11 (51-82)			47, 52, 54, 61										75)	77)	
Name of System	Integrated Ship Control (ISC) - Machinery Control System	Integrated Ship Control (ISC) - Machinery Control System	Machinery Control System	Machinery Control System	Engineering Control System	Engineering Plant Control System - Damage Control Console	Machinery Plant Control and Monitoring System	Engineering Control System	Machinery Control System	Engineering Control System	Machinery Control System	Advanced Engineering Control System	Integrated Ship Control System	Machinery/Ship Control System	Smart Carrier Machinery Control System	Digital Data Control Network Machinery Control System	Machinery Control and Monitoring System	
Number of I/O Points	3229	3229	4000	4000	37000	750	6300+	7000+	13000	7023	3500	1500	1300	800-1000	3000-4000	3000-5000	~7000	
Controller OEM & Technology	Sperry Marine (VME-contl)	Herschel (VME-contl)	Lockheed Martin (AN/UYK-44)	Lockheed Martin (VME - Navy only)	Sperry (VME, PLC)	Lockheed Martin (SEM); DCC=PLC	DRS (PLC)	L-3 Marine (VME)	Sperry Marine (VME-Navy only)	L-3 Marine (VME)	EDI (PLC)	Rockwell (PLC)	Rockwell (PLC)	L-3 Marine (VME)	Rockwell (PLC)	Siemens (PLC)	TBD (PLC)	
Workstation OEM	Sperry Marine	Intergraph	Lockheed	Lockheed	Raytheon	Lockheed (consoles); Intergraph (DCC)	DRS	L3 Herschel	Sperry Marine	Sperry Marine	Intergraph	Intergraph	Intergraph	L-3	Intergraph Daisy Data	Henschel Technionics Daisy Data	TBD	
GT Controller OEM	Woodward	Woodward	Lockheed-Martin IIEC/UEC	Lockheed-Martin UEC/UEC Blue	Woodward	GE IIEC	Rolls Royce	Woodward	Woodward	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Core Switch OEM & Technology	Xylan (ATM)	Ruggedcom (Gig-E)	Boeing (DMS)	Boeing (FOOMS)	Cisco (Gig-E)	DCC=Alcatel (Gig-E)	Alcatel (Gig-E)	Alcatel (Gig-E)	Alcatel (Gig-E)	Cabletron (ATM)	Alcatel (10MBS)	Ruggedcom (Gig-E)	Alcatel (ATM)	CAE (RS-422)	Alcatel (Gig-E)	Alcatel Foundry (Gig-E)	TBD	
Operating Systems	WinNT; PharLap	Win2000; PharLap	SDEX	Windows NT	Linux	Windows XP Pro, Windows 2000	Windows XP/Server 2003	Win2000	Consoles are Windows XP, DAUs are Linux	WinNT 4.0	Window NT SP3	Windows XP/Embedded Windows XP	Windows NT 4 Sever	MTOS	Windows XP/Embedded XP	Windows 2000	TBD	
Software Language	Ada	Ada	CMS-2m	CMS-2m, C	Ladder Logic, C++, Java	C++, Ladder Logic	Siemens Step 7	ROSE, C++	Ada	ROSE, C++	Wonderware	C++, Ladder Logic	C++, Ladder Logic	PLM	C++, Ladder Logic	Ladder Logic	Ladder Logic	
HMI Software	Wonderware	Wonderware	N/A	Altia	Java	Visual C++	Java	RAVE	Wonderware	RAVE	Wonderware	Visual C++	In house Visual C++	Proprietary Page Compiler	Visual C++	Wonderware, WinCC	JAVA	

class has a unique MCS

- Several classes have multiple

configurations

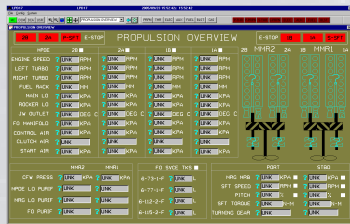
• DDG51, CG47, etc.

- 94+ Unique VME cards across surface fleet

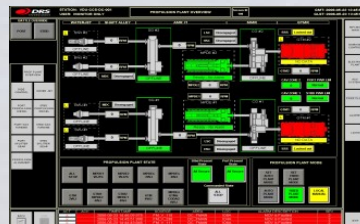
• 8600+ Total Population

- 23+ Unique Workstations

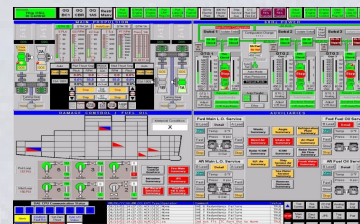
- Custom HMI Displays for each ship class



LPD 17



LCS 1



CG 47

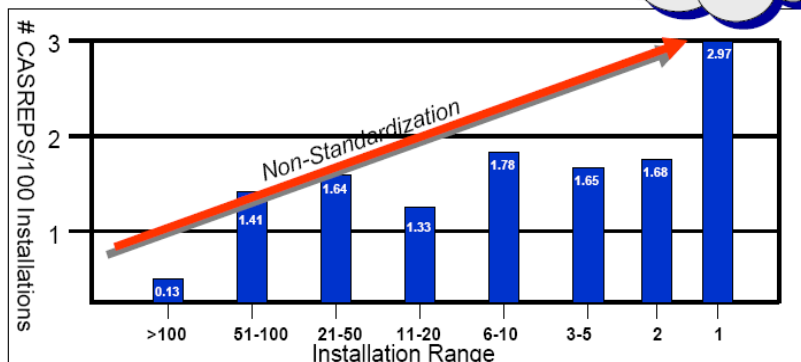
*Non-Standardization Abounds*

# Mandate for Commonality

## Impact of Low Density HM&E

- Proliferation of non-standard HM&E
  - Drives higher life cycle logistics support costs
  - Negatively impacts readiness

Approximately 51%  
or 65K Equipment  
Have 5 or fewer  
Fleet installs

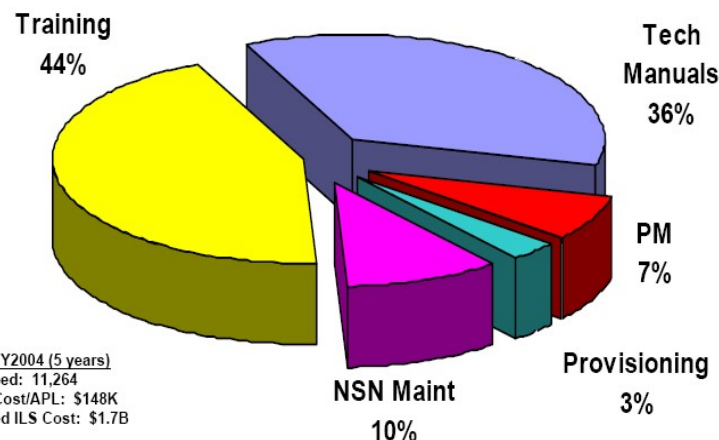


Costs ↑ Readiness ↓

- Drives increased ILS Support Costs

## Non Standard HM&E Hardware

## Average ILS Cost per HM&E APL Introduction



FY2000 thru FY2004 (5 years)  
APLs developed: 11,264  
Average ILS Cost/APL: \$148K  
Total Projected ILS Cost: \$1.7B

Drives additional inefficiencies across  
Maritime sustainment processes

# Unique HM&E Varieties in the Fleet

- Masts & Kingposts - 47
- Diesel Engine - 187
- Gas Turbine Engine - 30
- Reduction Gear - 641
- Clutches & Couplings - 1,113
- Shaftings - 141
- Bearings - 383
- Propulsors - 125
- Rudder - 34
- Motors - 7,125
- Ship Service Generators - 57
- Emergency Generators - 53
- Frequency Converters - 52
- Pumps - 4,171
- Valves - 37,709
- A/C units - 123
- Distilling Plants - 82
- Air Compressors - 203

**Need a New Valve Today?**

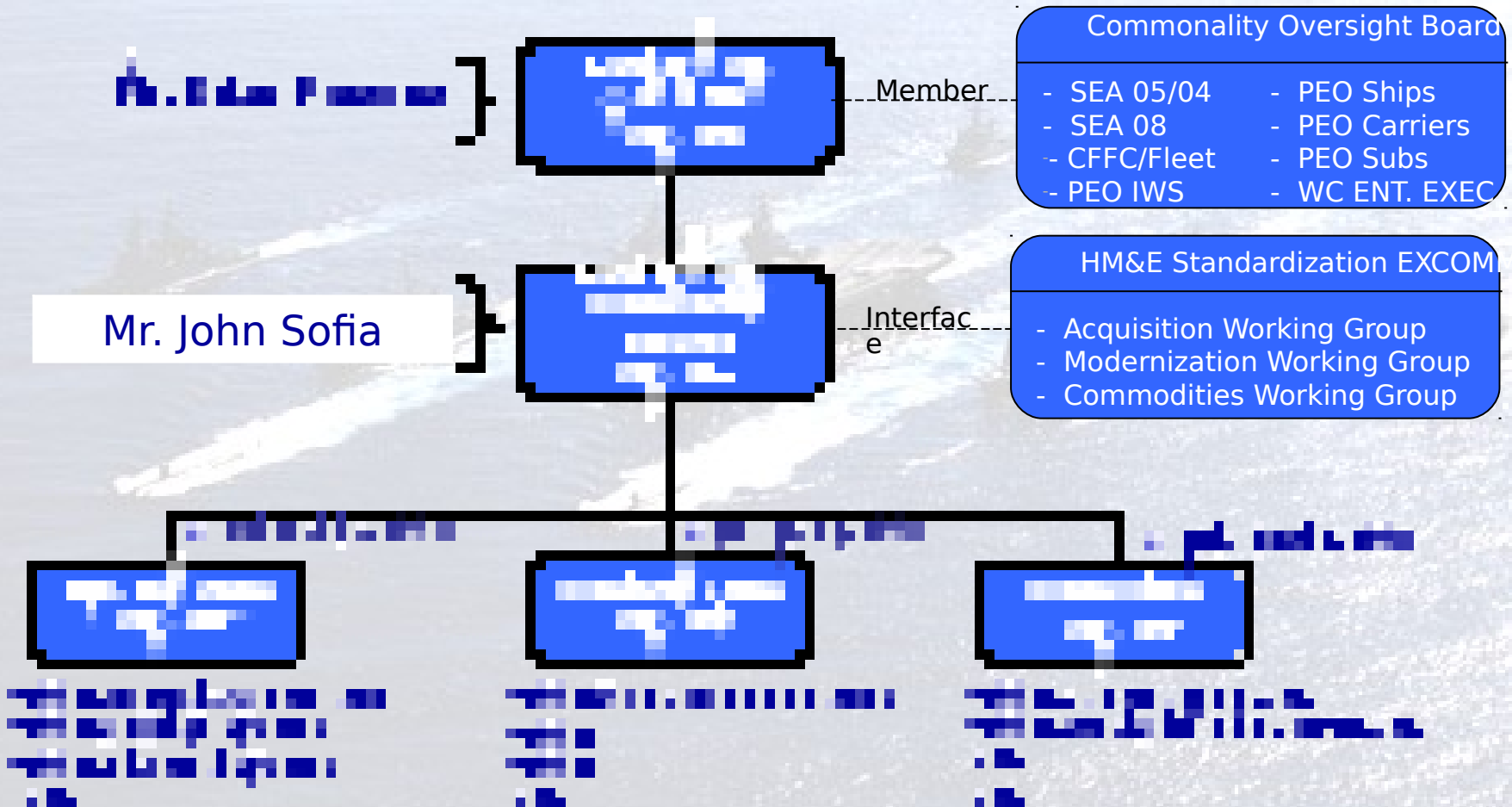
***More Commonality Will Reduce Total Ownership Cost***

# *Basic Commonality Approach*

<b>What Commonality is</b>	<b>What Commonality is NOT</b>
<ul style="list-style-type: none"><li>▪ Reduce parts/systems</li><li>▪ Critical examination of necessary variation</li><li>▪ Applied at the logical level of design</li><li>▪ Includes Business Case Analysis</li></ul>	<ul style="list-style-type: none"><li>▪ Elimination of all variation</li><li>▪ Sacrifice performance, safety, quality</li><li>▪ Not applied to all levels of design</li><li>▪ Impacts every system or where there is no justification</li></ul>

*Reduce Variation & Maintain Performance  
... But One Size Won't Fit All*

# Commonality Organizational Structure and Interfaces



*Like Safety, Drive Commonality  
through Technical Authority – Technical Warrant*

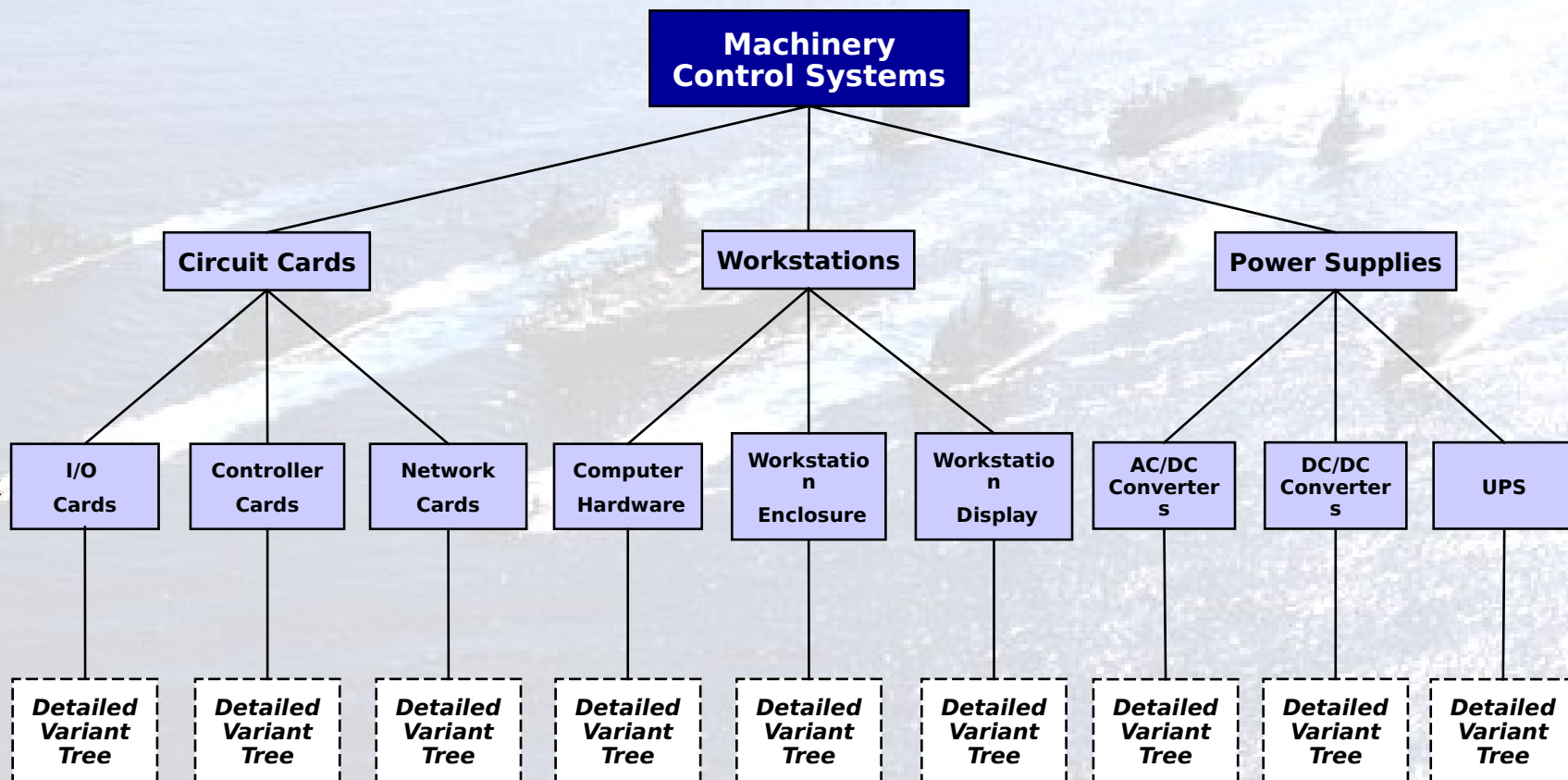
# Deep Dive #1: Machinery Control Systems

**Top-Level  
System**

**Sub-  
Systems**

**Focus  
Component  
Groups**

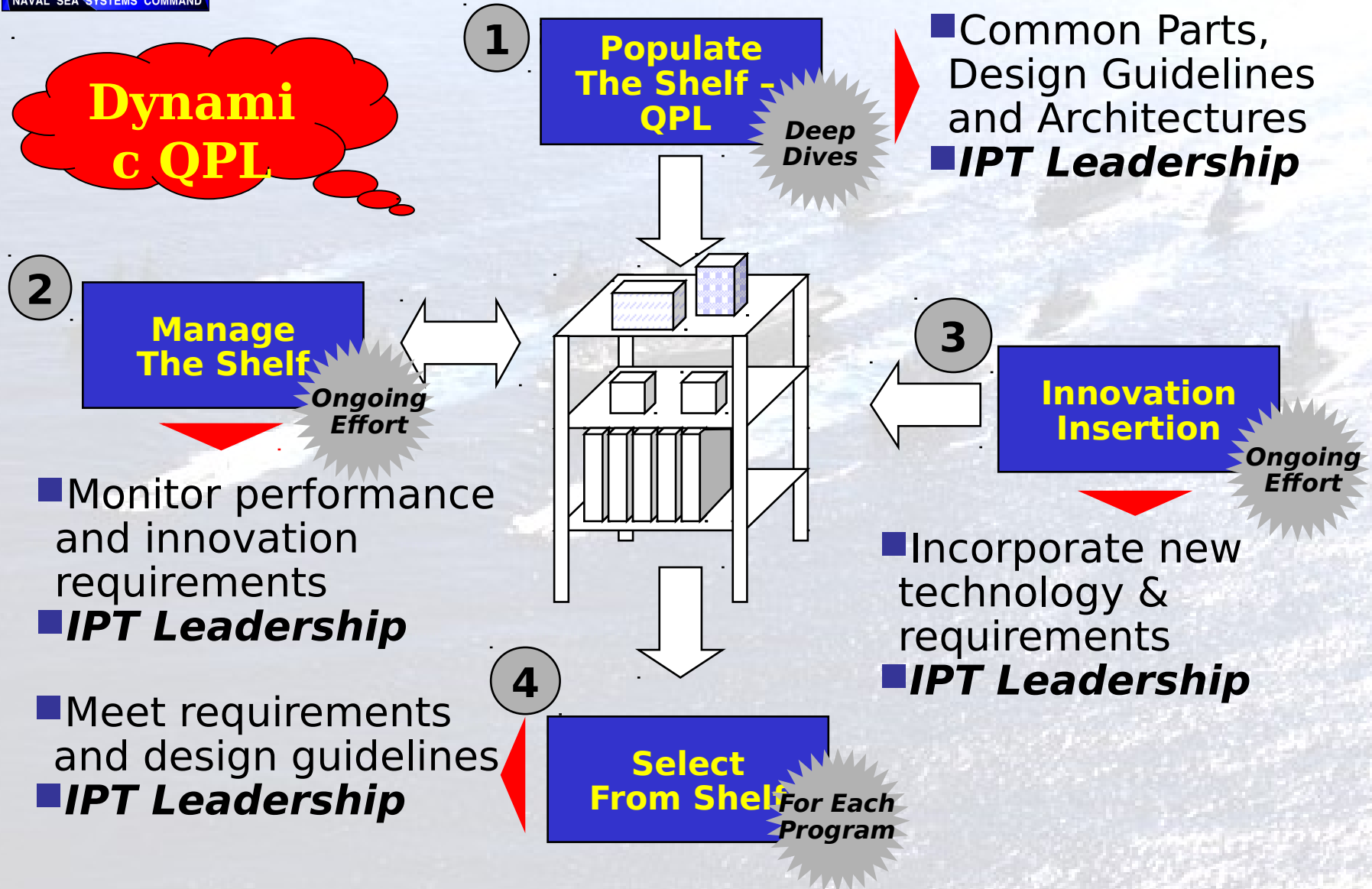
**Attribut  
e-based  
Variant  
Trees**



**Example Tree**

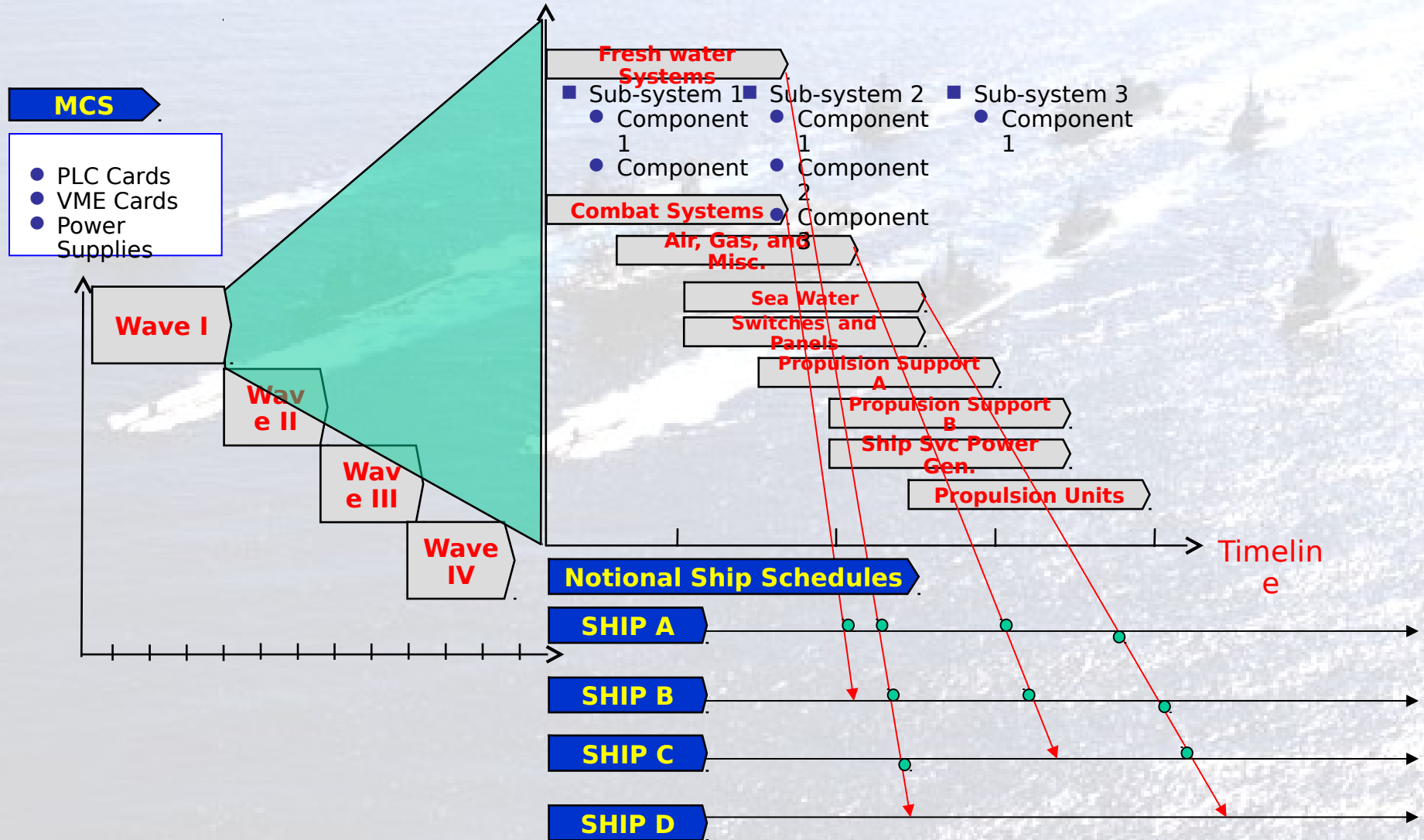
*Detailed Variant Trees Map Existing  
Complexity*

# Component/System Management



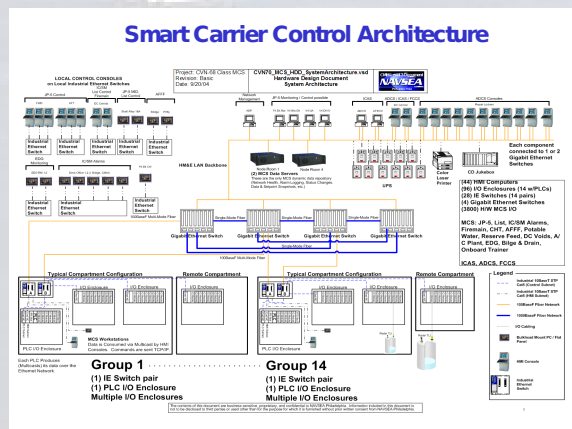
## 4-Step Commonality Management Process

# Align Preferred Components & Systems With Targets of Opportunity



# Machinery Controls Commonality

- **Smart Carrier (SC) Program**
  - Navy Developed Design
  - Tailored System Functionality
  - Reusable Software Modules
  - Standard Automation Components
- **CVN 78**
  - Leverage Smart Carrier Design for PPMC and MCMS
  - Common Component Selection based on SC
  - Leverage SC Software Modules



Current Configuration	ICAN					Smart Carrier					
Major Systems/Applications	68	69	76	77	77	70	71	72	73	74	75
HME Network	CU08	CU10	CU10	19	CU12	CU09	A13	C03	C03	C06	C06
JP-5 Control/Monitoring	CU08	CU10	CU10	19	CU12	CU09	CU07	C03	C03	C06	C06
Firearm Control/Monitoring	A08	CU10	CU10	19	CU12	CU09	A13	C03	A11	C06	C06
List Control/Monitoring	CU08	CU10	CU10	19	CU12	CU09	A13	C03	C03	C06	C06
ICS/M Alarms (CCS)	CU08	CU10	CU10	19	CU12	CU09	A13	C03	C03	C06	C06
ICS/M Alarms (Whole Ship)	UN	UN	CU10	19	CU12	A09	UN	UN	UN	UN	UN
Potable Water Monitoring	UN	CU10	UN	19	CU12	A09	UN	UN	UN	UN	UN
Reserve Feed Monitoring	UN	CU10	UN	19	CU12	A09	UN	UN	UN	UN	UN
A/C Plant Monitoring	A08	A13	A14	UN	A15	A09	A13	A16	A13	A13	C06
LPAC/Q2/Q2 Monitoring	A08	A13	A14	UN	A15	A09	A13	A16	A13	A13	C06
AFFF Control/Monitoring	CU08	CU10	CU10	19	CU12	UN	UN	UN	UN	UN	UN
CHT Control/Monitoring	CU08	UN	UN	UN	UN	A09	A13	C03	A10	C06	C06
Bilge and Drain Control/Monitoring	UN	CU10	UN	19	CU12	A09	UN	UN	UN	UN	UN
DC Void Monitoring	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Ventilation System Control/Monitoring	UN	UN	CU10	19	CU12	UN	UN	UN	UN	UN	UN
JP-5 Onboard Trainer System	A08	A10	UN	UN	A12	A09	A13	A07	A07	C06	C06
ADCS	A08	A10	A10	UN	A12	CU09	A13	C03	C03	C06	C06
ICAS	A08	A10	A10	UN	A12	CU09	A13	C03	C03	C06	C06
FCCS	A08	A10	A10	UN	A12	CU09	A13	C03	C03	C06	C06

## Smart Carrier Common Hardware Components (CVN 75 List)

- (74) I/O Boxes / Racks
  - (12) contain PLC Processors
  - (44) 24x24x10
  - (19) 24x24x8 (Submersible)
  - (1) 36x30x8
  - (10) Rack Mount
- (13) Industrial Ethernet Switches (Pair in CCS)
- (4) Core Gigabit Ethernet Backbone Switches
- (4) Uninterruptible Power Supplies (UPS) - Nodal
- (46) PC HMI Computers
  - (12) NEMA
  - (11) Industrial Desktop
  - (10) Bulkhead Flat Panel (OI)
  - (6) Bulkhead (I P-5)
  - (4) Pedestal (CCS)
  - (2) Rack mount
- (1) CD Jukebox
- (1) Color Laser Printer

*Commonality Theory Into Practice...*



***Questions?***